

# Predicting Response to Biologic Therapy in Patients with Axial Spondyloarthritis

Jones GT<sup>1</sup>, Dean LE<sup>1</sup>, Pathan E<sup>2</sup> and Gary J Macfarlane<sup>1</sup>

1. Epidemiology Group and Aberdeen Centre for Arthritis and Musculoskeletal Health, School of Medicine, Medical Science and Nutrition, University of Aberdeen, United Kingdom
2. Spondylitis Program, Department of Rheumatology, Toronto Western Hospital, Canada

## Background / Aims

In axial spondyloarthritis (axSpA), the benefits of TNF inhibition (TNFi) are well documented. However, a subset of patients will not respond. Here, the aim was to identify factors that predicted treatment response in axSpA patients commencing TNFi.

## Methods

The British Society for Rheumatology Biologics Register for Ankylosing Spondylitis (BSRBR-AS) recruited biologics-naïve patients with axSpA from 83 centres across Great Britain (2012-2017). Clinical data was obtained from medical records, with additional data from postal questionnaires. Treatment response was determined as change from high/very high Ankylosing Spondylitis Disease Activity Scale (ASDAS $\geq$ 2.1) to moderate/inactive disease (ASDAS $<$ 2.1).

Factors associated with response were determined using logistic regression. Thereafter, multivariable analysis was used to identify which group of factors best predicted treatment response. The BSRBR-AS June 2017 dataset was used.

## Results

249 participants were eligible for analysis; 69% male; median age 47yrs. 96% met ASAS imaging criteria, of whom 67% had ankylosing spondylitis.

Median follow-up was 14wks, at which point 35% were classified as treatment responders. For every 1 unit increase in disease activity (BASDAI) there was a 29% decrease in the odds of response (odds ratio 0.71; 95%CI 0.60-0.85). A similar effect was seen with increasingly poor function (BASFI: 0.70; 0.61-0.81). Other factors associated with response on univariable analysis were wide-ranging, including clinical, socioeconomic and patient-reported factors (see Table).

Four independent predictors were identified. Patients in full-time employment and with high education were more likely to respond, as were those with better mental health. Increasing comorbidities was associated with poor response. The final model demonstrated positive and negative predictive values of 63% and 77% respectively.

## Conclusion

Four variables, none of them disease specific, identified axSpA patients commenced on TNFi, who were unlikely to have responded, four months later. Other patients may need additional therapeutic approaches and additional support to achieve optimal outcomes.

Baseline predictor <sup>1</sup>	Odds ratio (95%CI)		
		Univariate association	Independent predictors
<b>Clinical factors</b>			
Disease activity	BASDAI	0.71 (0.60-0.85)	
	ASDAS	0.74 (0.55-0.99)	
Bath indices	Function (BASFI)	0.70 (0.61-0.81)	
	Metrology (BASMI)	0.83 (0.70-0.99)	
	Global health (BASG)	0.68 (0.57-0.81)	
Presence of extra-spinal manifestation [Reference = Absence of symptom]	Heel enthesitis	1.18 (0.51-2.73)	
	Uveitis	1.15 (0.62-2.12)	
	Dactylitis	1.63 (0.53-5.01)	
	Psoriasis	0.80 (0.33-1.93)	
	Inflammatory bowel disease	0.76 (0.32-1.81)	
Classification criteria [Reference = modified New York]	Peripheral joint disease	0.87 (0.46-1.67)	
	ASAS imaging	0.89 (0.50-1.56)	
Pain	ASAS clinical	1.84 (0.51-6.62)	
	Spinal VAS	0.84 (0.74-0.96)	
CRP (mg/dL)		0.99 (0.97-1.01)	
Comorbidity count		0.51 (0.35-0.75)	0.60 (0.38-0.95)
BMI (kg/m <sup>2</sup> )		0.94 (0.89-1.001)	
<b>Socioeconomic factors</b>			
Highest education level [Reference = Secondary school]	Apprenticeship	1.97 (0.80-4.86)	1.43 (0.50-4.08)
	College	1.17 (0.57-2.42)	1.01 (0.43-2.36)
	University	2.64 (1.26-5.53)	1.72 (0.72-4.10)
	Further degree	3.51 (1.29-9.54)	2.62 (0.82-27.5)
Deprivation (quintiles) [Reference = 1, Least deprived]	2	0.59 (0.29-1.23)	
	3	0.39 (0.17-0.85)	
	4	0.43 (0.19-0.99)	
	5, Most deprived	0.36 (0.14-0.93)	
Employment [Reference = Full-time work]	Part-time	0.23 (0.09-0.57)	0.28 (0.11-0.74)
	Unpaid/seeking	0.21 (0.04-1.04)	0.24 (0.05-1.28)
	Retired	0.68 (0.30-1.55)	0.90 (0.33-2.47)
	Retired/unemployed due to ill-health	0.04 (0.01-0.18)	0.04 (0.005-0.34)
	Student	2.90 (0.29-28.7)	2.67 (0.26-27.5)
<b>Patient-reported outcomes</b>			
Quality of life	ASQoL (range: 0-18 <sup>2</sup> )	0.82 (0.76-0.88)	
Physical health	SF12 Physical summary (range 0-100 <sup>3</sup> )	1.07 (1.03-1.10)	
Mental health	SF12 Mental summary (range 0-100 <sup>3</sup> )	1.06 (1.04-1.09)	1.05 (1.01-1.08)
	HADS anxiety (range 0-21 <sup>2</sup> )	0.87 (0.81-0.93)	
	HADS depression (range 0-21 <sup>2</sup> )	0.86 (0.80-0.93)	
Fatigue/Sleep**	Chalder Fatigue Scale (range 0-11 <sup>2</sup> )	0.87 (0.80-0.93)	
	Jenkins Sleep Scale (range 0-20 <sup>2</sup> )	0.94 (0.89-0.98)	
Smoking [Reference = Never]	Ex	0.66 (0.36-1.21)	
	Current – light	0.30 (0.10-0.97)	
	Current – heavy	0.72 (0.32-1.59)	
Alcohol drinking	Never	0.20 (0.04-0.92)	
	Ex	0.45 (0.21-0.96)	

[Reference =  $\leq 14$   
units/week]

Current  $>14$  units/week

1.30 (0.42-4.05)

- 1 For non-categorical variables, results are given per 1 unit increase
- 2 High score = worse
- 3 High score = better